City of Bozeman Landscape and Irrigation Performance and Design Standards Manual

4/27/2024

TABLE OF CONTENTS

Section **Page No.**

1 INTRODUCTION

This Landscape and Irrigation Performance and Design Standards Manual ("Manual"), was developed to establish water efficient landscape and irrigation performance and design standards required pursuant to Bozeman Municipal Code (BMC) 38.550.060. The water efficient landscape and irrigation performance and design standards promote the design, installation, and maintenance of landscaping and irrigation in a manner that conserves local water resources by ensuring that landscaping projects are not unduly water-needy and that irrigation systems are appropriately designed and installed to minimize water waste.

Other regulations affecting landscape and irrigation performance, design and maintenance standards may be applicable and should be consulted as needed. These regulations include but may not be limited to:

1) Water Conservation and Drought Response Regulations of the City of Bozeman, located on the City of Bozeman Water Conservation Division webpage;
2) The City's Zoning Code;
3) The City's Utility Code;
4) The City's Building Code; and
5) Conditions of approval for a specific development project. For more information about conditions of approval, contact the Community Development Department.

Failure to comply with the requirements of this Manual, the approved landscape and irrigation plan, and any required conditions of approval related to this Manual or the landscape and irrigation plan may result in a stop work order or withholding of a certificate of occupancy pursuant to BMC 10.02.010, or other lawful sanction.

1.1 Purpose

The purpose of this Manual is to provide procedural and design requirements for development project applicants proposing landscape and irrigation installation subject to the requirements of the Bozeman Municipal Code. This document is also intended for use and reference by City of Bozeman ("City") staff in reviewing and approving designs and verifying compliance with the BMC.

1.2 Authority and Applicability

BMC 38.550.020 provides authority to the Bozeman City Commission to adopt standards and guidelines implementing division 38.550 of the BMC.

BMC 38.200.010 authorizes the Director of Utilities to approve, approve with conditions or deny landscape and irrigation plans per BMC 38.550.060.

Landscape design and irrigation requirements apply to all the following landscape projects:

1) **Sketch Plans:** New single household, townhome, duplex, triplex, and fourplex developments subject to requirements outlined in BMC 38.230.070.

   Applicants are afforded a streamlined approach to ensuring landscaping and irrigation is compliant with standards through the submittal of a self-certification form included in Appendix E of this Manual.

2) **Plats, Site Plans, Planned Development Zones:** All development projects subject to the requirements outlined in BMC. 38.550.040.

   Applicants must create compliant landscape designs via one of two design pathway options: the prescriptive (percentage-based) design approach; or the performance (water budget-based) design approach.

   The prescriptive pathway provides a simple, but less flexible, pathway to receive landscape design approval. This pathway limits the total amount of turfgrass permitted to be installed to a certain percentage

of the total landscaped area[1]. The remaining landscaped area is limited to the installation of drought-adapted or drought-tolerant plants, and landscape design elements such as rock mulch and wood mulch.

The performance pathway provides flexibility in landscape design by limiting the total amount of supplemental water required by the entire landscaped area to meet vegetation water demand, rather than setting limits on the installation of certain vegetation types.

The prescriptive and performance pathway achieve similar water savings and therefore result in a substantially equivalent water conservation standard.

1.3 Exemptions

Certain projects, plant materials, and irrigation types are exempt from some or all the landscape and irrigation requirements set forth in this Manual. Situations and project types that may warrant an exemption from these requirements are outlined in this Section.

Unless otherwise determined by the review authority, the standards outlined in this Manual do not apply to:

1) Reclamation and restoration projects such as superfund sites and brownfields that do not require a permanent irrigation system; and
2) Plant collections as part of botanical gardens, and arboretums open to the public.

Edible Gardens and Urban Farming

The City recognizes the importance of edible gardens and urban farming as a reliable source of food for residents. In general, areas dedicated to edible gardens and urban farming are not subject to the requirements of this Manual if all of the following criteria are met:

1) Edible gardens must be included on the landscape plan, including total square footage. Edible garden areas need not be included: (i) in the water budget calculation for determining compliance with the performance-based approach to landscape design creation; (ii) the area calculations required to demonstrate compliance with the prescriptive, percentage-based approach to landscape design creation; (iii) as part of the site area coverage requirement; (iv) nor are edible gardens considered part of the landscaped area.
2) If connected to an automated irrigation system, drip irrigation must be utilized. Automated overhead irrigation, including the use of micro-sprays, is prohibited in these areas.
3) If an automated irrigation system is installed and not used to irrigate the area dedicated to edible gardens, the system must be disabled.

Temporary Irrigation

In some cases, the germination of native seed and the establishment of low and very-low-water-use plants may only require temporary irrigation. In general, landscaped areas that are irrigated solely by a temporary irrigation system are exempt from meeting irrigation requirements outlined in Section 3 of this Manual. The following requirements apply to the installation and use of temporary irrigation systems:

1) Temporary irrigation is afforded a water demand of 2.3 gallons per square foot regardless of plant type.
2) Temporary irrigation may be achieved through multiple methods including, but not limited to:
   a) A permanent underground irrigation system that is later disabled;
   b) A temporary surface irrigation system that is later removed;
   c) The use of a handheld watering device such as a bucket, hose, or soaker hose;
   d) Hauled water.

[1] See Appendix A – Definitions, for the definition of landscaped area.

3) If temporary irrigation is used, project applicants must define and identify on the irrigation design plan all the following for each plant material type and area:
    a) Total area (square feet) receiving only temporary irrigation;
    b) Temporary establishment irrigation method. All temporary overhead irrigation must use rotors or multi-spray, multi-trajectory rotary nozzles. Temporary overhead irrigation must be designed to achieve head to head coverage;
    c) Duration of establishment period. The establishment period may not exceed three years unless otherwise approved by the review authority;
    d) Application rates; and
    e) Monthly and annual water demand totals for the establishment period.
4) Temporary irrigation must be clearly labeled and identified on the irrigation design plan and must specify whether overhead or drip irrigation will be used.
5) Signage is encouraged. The City encourages the applicant to install a temporary waterproof sign in a location visible from each adjacent road stating the following:
    a) TEMPORARY IRRIGATION;
    b) Dates of the temporary irrigation;
    c) Contractor's contact information.
6) All temporary irrigation systems must be disabled at the end of the establishment period. Methods for disabling irrigation include but are not limited to disconnecting wires for control valves in the controller, setting runtimes for establishment period zones to zero, or physically removing components of the zone(s) so it may no longer operate. Any temporary irrigation installed above ground must be physically removed.

Plant Nurseries

Commercially licensed nurseries irrigating plants for retail or wholesale sale are not subject to the requirements of this Manual.

Watercourse Setback Planting Plans

Watercourse setbacks are exempt from landscaping requirements including the site area coverage requirement and are not part of the landscaped area. However, watercourse setback plantings must meet requirements outlined in BMC 38.410.100.A.2.f. Irrigation is not required in the watercourse setback, but if irrigation is to be installed within the watercourse setback, the irrigation system must meet requirements outlined in this Manual. Existing watercourse setback plantings are excluded from the Water Budget Calculator.

Stormwater Detention or Retention Ponds

Stormwater detention and retention ponds are exempt from landscaping requirements including the site area coverage requirement and are not part of the landscaped area if irrigation is not installed. Stormwater detention or retention plantings must meet requirements outlined in BMC 38.410.080. Irrigation is not required in the detention or retention pond area, but if irrigation is to be installed, the irrigation system must meet requirements outlined in this Manual, be included in the Water Budget Calculator, and is subject to vegetation percentage limitations.

Water Treatment and Low-Impact Development

Constructed wetlands used for water treatment on the property, habitat protection, or stormwater best management practices are not subject to the Water Budget Calculator or vegetation percentage limitations, site area coverage requirements, and are not considered as part of the landscaped area. Irrigation is not required in these areas, but if irrigation is to be installed, the irrigation system must meet requirements outlined in this Manual, be included in the Water Budget Calculator, and is subject to vegetation percentage limitations.

Public Parks

Public parks include parkland dedicated to the City and lands maintained by the City for recreation and park purposes. Parks may require the installation of plant material that requires more water than the water conservation standards outlined in this Manual authorizes. As a result, public parks are exempt from the landscaping requirements outlined in this Manual. To further City water conservation goals, public parks must adhere to irrigation requirements listed in Section 3 of this Manual.

1.4 Departures

To achieve the optimal design and function of a property or project, it may be necessary and beneficial to depart from the landscape and irrigation requirements set forth in this Manual per BMC 38.250.060. Situations and project types that may warrant a departure from these requirements are outlined in this Section. The request for a departure must be submitted with the initial application for any development. Locations qualifying for the departure must be clearly identified on the landscape or site plan. Review times and processes are coordinated with the overall development application.

The following types of departures are available:

Established Vegetation Preservation

1) *Purpose.* To encourage the preservation of existing established vegetation, including but not limited to trees, shrubs, perennials, bunchgrasses, and/or groundcovers that use less water than new vegetation.
2) *Description.* Development sites may include existing established vegetation if such vegetation can be preserved on site.
3) *Procedures.* The review authority may allow areas of healthy, established vegetation to be included in the total landscaped area for the purposes of meeting requirements outlined in this Manual. These areas will have a water use value of zero gallons per square foot per year when calculating the irrigation water requirement (IWR) unless irrigation is added to support the existing vegetation.
4) *Criteria.* To approve this departure, the review authority must determine the following criteria are met:
    a) The existing vegetation is healthy;
        Note: For the preservation of existing trees, an International Society of Arboriculture (ISA) certified arborist must determine that the tree(s) proposed to be preserved on site are healthy.
    b) The existing vegetation does not contain noxious or invasive plants;
    c) The existing vegetation has a high chance of survival after project completion;
    d) The existing vegetation will be appropriately protected during project construction; and
    e) New irrigation is not necessary to support the established vegetation.

Historic Preservation

1) *Purpose.* To encourage the preservation of existing, established trees in the Neighborhood Conservation Overlay District (NCOD). This departure applies only to development occurring in the NCOD.
2) *Description.* A healthy, established, urban tree canopy provides numerous benefits to the community including reduced water demands for the vegetation under the tree canopy. Trees within the NCOD are typically large, established trees that contribute to these benefits. As a result, preserving these trees will result in an increased allowance for turfgrass or other groundcover that will require less water because of the existing established tree canopy.
3) *Procedures.* The review authority may approve departures from the landscape and irrigation requirements in this Manual if healthy, established trees are preserved on site. In this case, up to 15% additional turfgrass, or its equivalent in water use, may be planted and irrigated depending on the size of the healthy, preserved tree(s). These trees may also apply towards the tree planting requirement listed in Section 3 of this Manual.
4) *Criteria.* To approve this departure, the review authority must determine the following criteria are met:
    a) The tree is deemed healthy by an International Society of Arboriculture (ISA) certified arborist and is at or near its mature, established size for its species;

b) The allowance of up to 15% additional turfgrass, or its equivalent water use, is based off tree canopy area. The additional turf allowed is equal to 30% of the area provided by the tree's canopy, per tree. For example, one tree with a 30' canopy allows for 215 square feet of additional turf.
c) The areas to receive additional turf, or its planting equivalent, will be shaded by the preserved tree(s) as much as possible;
d) The tree(s) has a high chance of survival after project completion; and
e) The tree(s) will be protected from damage during project construction.

Open Space Recreation Areas

1) *Purpose.* To accommodate open space areas dedicated solely to an active recreation activity. This departure applies only to privately owned open space subject to BMC 38.360.250. and BMC 38.520.060.
2) *Description.* Open space areas within a development committed to active recreational play provide positive benefits to residents of that development. These areas are subject to high foot traffic, and typically turfgrass is used to support recreational play in these areas.
3) *Procedures.* The review authority may approve a departure from the landscape requirements included in this Manual if additional turfgrass is required for a dedicated active recreation activity.
4) *Criteria.* To approve this departure, the review authority must determine the following criteria are met:
   a) Recreation areas are designed in the most efficient configuration to maximize irrigation efficiency;
   b) A need for the additional turfgrass is demonstrated by addressing the proximity, or lack thereof, to similar nearby recreation areas;
   c) The activities to be used in the open space area are defined and a description of how the layout and use of turfgrass is necessary for its function is included;
   d) If the open space area also includes stormwater features, the stormwater features must not impede on the area's ability to provide recreational benefits;
   e) No additional turfgrass outside of the recreation area(s) is included once the maximum turfgrass amount has been exceeded; and
   f) The remaining landscaped area includes low or very low water use plantings.

Cemeteries

1) *Purpose.* To allow for the installation of turfgrass in cemeteries.
2) *Description.* Turfgrass is the predominate plant type in cemeteries and continues to be part of the function and expected aesthetic in these areas.
3) *Procedures.* The review authority may approve a departure from the landscape requirements included in this Manual if additional turfgrass is necessary or required for these spaces.
4) *Criteria.* To approve this departure, the review authority must determine the following criteria are met:
   a) No additional turfgrass is included in areas where the turfgrass is not providing essential functions for the cemetery; and
   b) The remaining landscaped area includes low or very low water use plantings.

Previously Established City Project Specific Conflicting Condition

1) *Purpose.* To resolve conflict between the standards established in this Manual and project specific conditions imposed under prior regulations during the redevelopment or further development of the site and qualifying under criteria established below.
2) *Description.* To provide relief from standards that may otherwise require a variance or other non-administrative method of addressing conflict established by prior land use decisions of the city.
3) *Procedures*. The review authority may allow alternate landscaping plant palettes, irrigation configurations, plant coverage percentages, or other specific numeric standard established in this manual.
4) *Criteria.* To approve this departure, the review authority must determine all the following criteria are met:

a) The non-compliance with the standards of this Manual is the direct result of a project specific condition established by a decision to approve a land use application by the city of Bozeman prior to the effective date of this manual;
b) The applicant can provide the specific language of the condition and associated project review identifying number for the original application;
c) The conflict cannot be resolved by an administratively approved amendment to the previously approved subdivision, site plan, planned unit development, or planned development zone application;
d) The current application under review does not require full compliance with the standards of Chapter 38, BMC;
e) With the requested departure, the approved project advances the purposes of water conservation and reduces irrigation water use beyond the existing conditions on the site if the site has been previously developed; and
f) The approved departure must be the least departure from the standards of this manual that allows the conflict to be resolved.

1.5 Figures

The figures in this Manual are for illustrative purposes only and do not constitute regulatory standards. Figures may be revised, replaced, or added by the Water Conservation Division by administrative order issued by the Director of Utilities.

2 SKETCH PLAN PROJECTS

New single household, townhome, duplex, triplex, and fourplex developments subject to requirements outlined in BMC 38.230.070 must meet the landscape and irrigation requirements outlined in this Section.

2.1 Submittal Requirements

The purpose of this Section is to establish landscape and irrigation submittal requirements that must be provided to the City for new single household, townhome, duplex, triplex, and fourplex developments not subject to Section 3 requirements, below.

Applicants must submit a completed, signed, and dated Building Permit Landscape & Irrigation Self-Certification Form verifying compliance with landscape and irrigation performance and design criteria outlined in this Section. This form may be approved administratively by the Community Development Department or Utilities Department. The form is included in Appendix E in this Manual and is available on the City's website.

2.2 Required Landscape and Irrigation Performance and Design Criteria

The purpose of this Section is to establish required landscape and irrigation performance and design criteria for new single household, townhome, duplex, triplex, and fourplex developments not subject to Section 3 requirements, below.

The landscaping to be installed must meet the following standards:

1) Turfgrass areas may not exceed 35 percent of the total landscaped area or 400 square feet, whichever is more. Non-turfgrass landscaped areas must consist solely of low and/or very low water use vegetation, (plant factor of 0.3 or less), and landscape design elements such as rock mulch and wood mulch, except for raised beds dedicated to edible gardens. Please refer to the City of Bozeman plant list for acceptable plant types. It is strongly encouraged to install at least 50% native plants in the overall landscape.
2) In lieu of compliance with 1 (above), for those seeking more landscape design flexibility, a landscape water budget demonstrating the landscape does not exceed an average annual irrigation demand of 10 gallons per square foot for the entire landscaped area may be provided. Project applicants pursuing the water budget approach must provide a completed Water Budget Calculator as outlined in Appendix B with the signed and dated Building Permit Landscape & Irrigation Self-Certification Form.
3) For whichever approach is selected in 1 and 2 (above), the following apply:
    a) A minimum of 75 percent of trees must be drought adapted or have a plant factor of 0.3 or less.
    b) At least 60 percent of the site area not included in footprints of buildings or structures, sidewalks, driveways, walkways, or other hardscaped areas, such as decks or pervious pavers, must be landscaped and maintained with some combination of vegetative understory plantings, such as shrubs, perennials, turfgrass, creeping or rooting groundcovers, or other living plants (excluding weeds). The installation of at least 50% native plants in the overall landscape is encouraged.
    c) Landscaped areas must have at least 6 inches of topsoil depth throughout the entire planted area. The building footprint and all areas within 5 feet of the actual building are exempt from the topsoil requirement. The topsoil requirement may be met by implementing one of the following methods prior to planting:
        i) Amend existing topsoil at a rate of 4 cubic yards of compost/1000 square feet;
        ii) Amend existing topsoil based on the recommendations of a soil test; or
        iii) Import topsoil to achieve a minimum depth of 6 inches of topsoil.
    d) A minimum three-inch layer of mulch must be applied on all exposed soil surfaces of planting areas except for turf areas, creeping or rooting groundcovers, or direct seeding applications where mulch is disadvantageous.

e) Rock mulch is discouraged around private trees and prohibited around public, boulevard trees. Public, boulevard trees must have a 3' diameter wood mulch ring 3"-4" in depth.
f) Tree diversity requirements must be met according to the table below.

Deciduous and Evergreen Tree Plant Diversity Table

Number of Trees	*Maximum % of Single Species*
1-5	Can have 100% of one species
6-10	Maximum 50% of any one species
11-20	Maximum 33% of any one species
21+	Maximum 25% of any one species

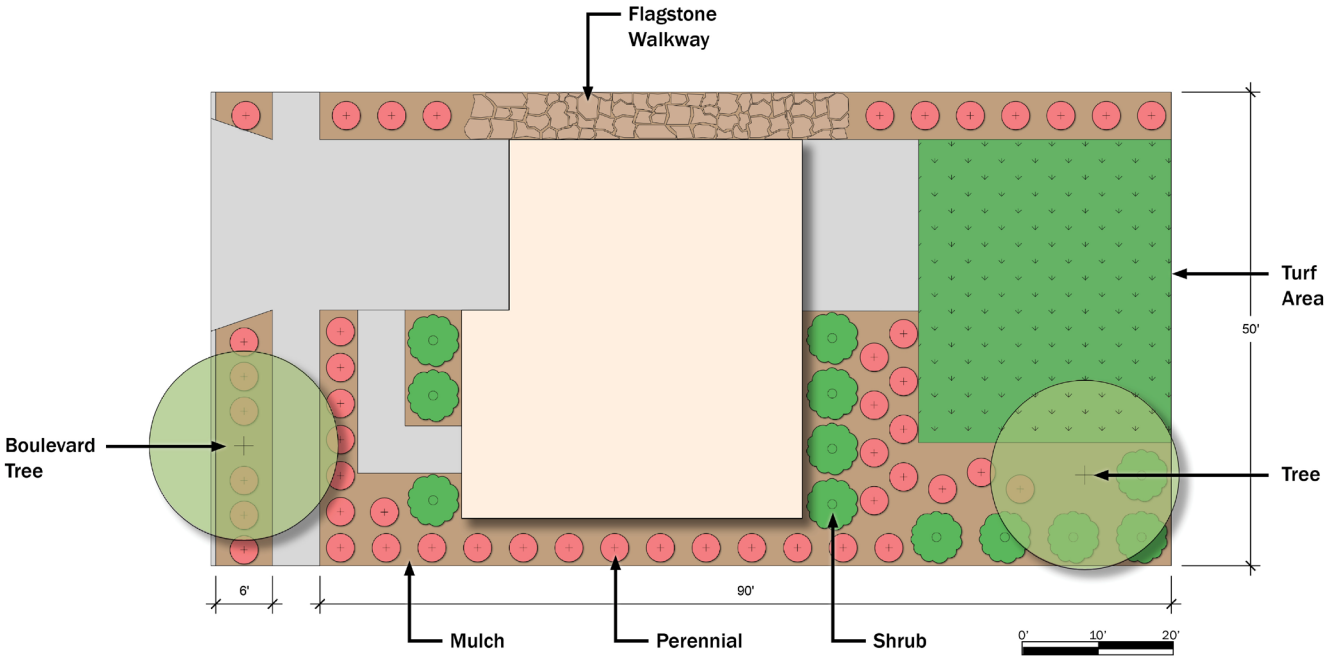

Figure 1: A single residential household showing the 35% turfgrass limit with the remaining 60% coverage requirement satisfied by shrubs and perennials.

Irrigation is not required for development projects subject to this Section. However, in areas where irrigation is to be installed, the irrigation must meet the following standards:

1) Backflow prevention devices are required (compliance with local plumbing code).
2) Irrigation controllers labeled by U.S. Environmental Protection Agency's WaterSense® Program must be installed on the irrigation system. Sensors (rain, freeze, wind, ET, soil moisture, etc.), either integral or auxiliary, that suspend or alter irrigation operation during unfavorable weather conditions or when sufficient soil moisture is present are required.
3) Overhead irrigation must consist of multi-stream, multi-trajectory (MSMT) nozzles, or an approved equal, and/or rotors.
4) Overhead irrigation must use a 6 inch minimum riser.
5) Sprinkler heads must be spaced 2 inches minimum from hardscape edges.

6) Irrigation systems must be designed to properly address hydrozoning in the landscape (plants with similar water needs are irrigated by the same valve or controller station).
7) Trees must be on a separate irrigation valve(s) from other plant types to allow for a unique watering schedule during drought-related outdoor watering restrictions. Drip irrigation, such as emitters, root watering systems, or bubblers, must be used to irrigate trees.
8) Drip irrigation must be used in all landscaped areas outside of turfgrass areas (except in areas without irrigation).
9) Areas less than 8 feet wide must be irrigated with drip irrigation, either subsurface or above ground. Overhead irrigation is prohibited in areas less than 8 feet wide unless being used for temporary establishment purposes only.
10) Irrigation systems must be installed to achieve optimal operating pressure. This may be accomplished by using pressure regulators at the zone valve or integrated into the sprinkler body. It is encouraged to use sprinkler bodies with integrated pressure regulators.
11) It is encouraged to connect all sprinkler bodies to the lateral line with flexible swing joints or swing pipe.
12) Irrigation pipe installed under hardscape surfaces must be sleeved in a rigid pipe.

3 PLAT, SITE PLAN, AND PLANNED DEVELOPMENT ZONE PROJECTS

Any site development that is not subject to Section 2, above, is subject to this Section 3. Any projects subject to BMC. 38.550.040 must meet landscape and irrigation requirements outlined in this Section and must receive landscape and irrigation plan approval from the review authority before proceeding with landscape and irrigation project installation.

These landscape and irrigation requirements also apply to landscaped open space areas that do not fall under the Exemptions or Departures Sections of this Manual.

3.1 Submittal Requirements

The purpose of this Section is to establish submittal requirements that must be provided to the review authority to receive landscape and irrigation design approval.

3.1.1 Plan Review Landscape Documentation Package

A Landscape Documentation Package must be submitted by the project applicant as part of the application to the Community Development Department. Applicant must receive approval prior to landscape and irrigation installation, including the issuance of any permits. Unless otherwise required by the Director of Community Development, the Landscape Documentation Package must include the following elements either on plan sheets or supplemental pages as required by the Director of Community Development:

1) Completed Landscape Design Plan meeting criteria outlined in Section 3.2 based on development type;
2) Completed Irrigation Design Plan meeting criteria outlined in Section 3.3 based on development type; and
3) Water Budget Calculator for Performance (water budget-based) Design Projects Only (Appendix B).

The Landscape Documentation Package is not applicable to new single household, townhome, duplex, triplex, or fourplex developments that are subject to Sketch Plan requirements outlined in Section 2 of this Manual.

3.1.2 Building Permit Landscape & Irrigation Self-Certification Form

A signed copy of the Building Permit Landscape & Irrigation Self-Certification Form (Appendix E) is necessary to receive a building permit.

3.1.3 Pre-Installation Meeting/Soils Approval or Certification

Prior to commencing any work, the applicant must contact the Water Conservation Division to schedule a pre-installation meeting. The pre-installation meeting will address the following:

1) The approved landscape and irrigation plan and requirements of this Manual;
2) Timing of required inspections including the final inspection to obtain a certificate of completion;
3) Soil amendment requirements and the process for approval of installed soil, including the party responsible for soils inspection;
4) Discussion of the day and hours for irrigation scheduling after installation;
5) The process required for making changes to the approved landscape and irrigation plan; and
6) Installation of landscaping and irrigation according to the approved landscaping and irrigation plan and requirements of this Manual, which is required to receive a final certificate of occupancy or releasing a security as provided by an improvement's agreement.

The pre-installation meeting must include all contractors responsible for the installation of the landscape and irrigation systems. This may include: the applicant's general contractor, the landscape architect or other design

professional responsible for the landscape and irrigation design, and any contractor or subcontractor that will be responsible for installing any component of the landscape and irrigation plan.

After installation or amendment of all soils required by the application approval, or after the City's approval of a soils report (and after the installation of any soil amendments required by the soils report), the applicant must contact the Water Conservation Division for inspection prior to the installation of any landscaping. In lieu of the City inspecting and approving soils, the applicant may have a landscape architect or landscape professional certify, on a form provided by the City, the soils have been installed as required by the landscape and irrigation plan and this Manual. The applicant shall not install any landscaping until the City approves the soil preparation or receives a signed certification.

3.1.4 Landscape Installation Certificate of Completion (Appendix F)

A signed Landscape Installation Certificate of Completion (Appendix F) must be submitted at Final Plat, prior to certificate of occupancy for site plans, or prior to releasing a security as provided by an improvements agreement. The Landscape Installation Certificate of Completion is required to notify the City the landscaping and irrigation for the identified property complies with the requirements of the landscape and irrigation plan and this Manual. See Appendix F for a copy of the Landscape Installation Certificate of Completion form. This form does not apply to areas dedicated as parkland.

3.2 Landscape Design Requirements

This Section applies to landscaped areas requiring permanent irrigation pursuant to BMC 38.550.

For the efficient use of water, a landscape must be carefully designed and planned for the intended function of the project. The following criteria must be complied with as part of the landscape design. Landscapes must be designed and installed in a manner that supports the conservation of water.

3.2.1 Landscape Design Standards

Landscapes must be designed pursuant to the standards of this Section.

Landscape Design Approval Pathways

Applicants may create compliant landscape designs via one of two design pathway options: the prescriptive (percentage-based) design approach; or the performance (water budget-based) design approach.

The prescriptive pathway provides a simple pathway to receive landscape design approval. This pathway limits the total amount of turfgrass permitted to be installed in the landscape to a certain percentage of the total landscaped area. The remaining landscaped area is limited to the installation of drought-adapted and/or drought-tolerant plants and landscape design elements such as rock mulch and wood mulch.

The performance pathway provides flexibility in landscape design by limiting the total amount of supplemental water required by the entire landscaped area to meet vegetation water demand, rather than setting limits on the installation of certain vegetation types.

Prescriptive Landscape Design Pathway (percentage-based approach)

Design criteria specific to this pathway includes:

1) Plant material must comply with the following:
   a) Turfgrass areas must not exceed 20 percent of the total landscaped area.
   b) All remaining landscaped areas must consist solely of low and/or very low water use vegetation (plant factor of 0.3 or less), and landscape design elements such as rock mulch and wood mulch, except for raised beds dedicated to edible gardens. Refer to the plant list in Appendix C.
2) Landscape Design Plan compliance with requirements outlined in 3.2.2 of this Manual.

Performance Landscape Design Pathway (water budget-based approach)

Design criteria specific to this pathway includes:

1) Plant material compliance with the following:
   a) Landscape plant water demands for the entire landscaped area must not exceed an average of 8 gallons per square foot per year.
   b) Landscape Design Plan compliance with requirements outlined in 3.2.2.
   c) Project applicants following the performance pathway must provide a completed Water Budget Calculator as provided. See Appendix B. The performance landscape design pathway also relies on plant factor water use data outlined in the City of Bozeman Plant List (Appendix C).

Landscaped Area Coverage Requirements

1) Landscaped area is defined in Appendix A. At least 60 percent of the site area not included in footprints of buildings or structures, sidewalks, driveways, walkways, or other hardscaped areas, such as decks or pervious pavers, must be landscaped and maintained with some combination of vegetative understory plantings, such as shrubs, perennials, turfgrass, creeping or rooting groundcovers, or other living plants (excluding weeds). Rock mulch or wood mulch must be installed in all landscaped areas not covered with plant material. The installation of at least 50 percent native plants in the overall landscape is encouraged. Certain areas listed under Section 1.3 are exempt from being included in the site area coverage requirement listed above.
   a) A minimum of 10 percent of the landscaped area must be vegetated with container grown shrubs or perennials. This requirement does not apply to City right-of-way boulevard strips and medians.
   b) Evergreen trees count towards the landscape plant coverage requirement. Deciduous trees do not count towards this requirement.
      i) 8 feet of canopy spread (or 50 square feet) shall be used for evergreen trees when calculating plant size for the coverage requirement.
   c) The average mature plant size shall be used when calculating coverage amounts.
   d) Artificial plant materials do not count towards the landscape plant coverage requirement (BMC 38.550.050.F.4.).

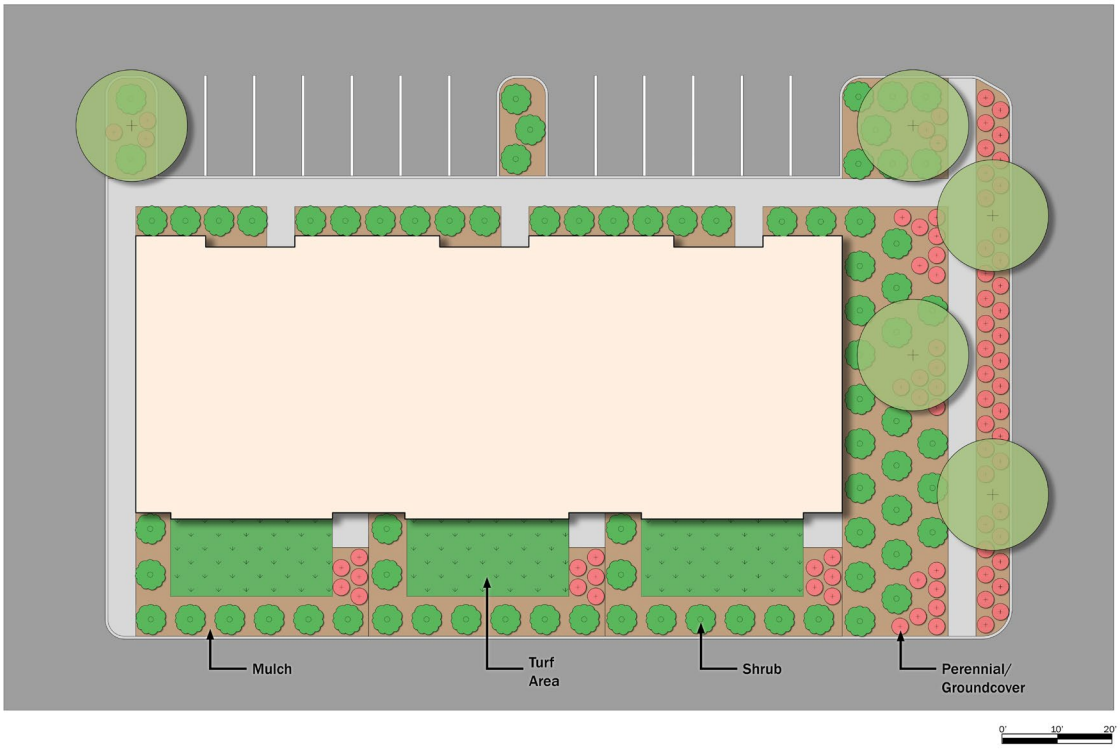

Figure 2: This multi-household residential site plan showcases the 20% maximum allowable turf amount with the remaining 60% coverage requirement satisfied by shrubs and perennials.

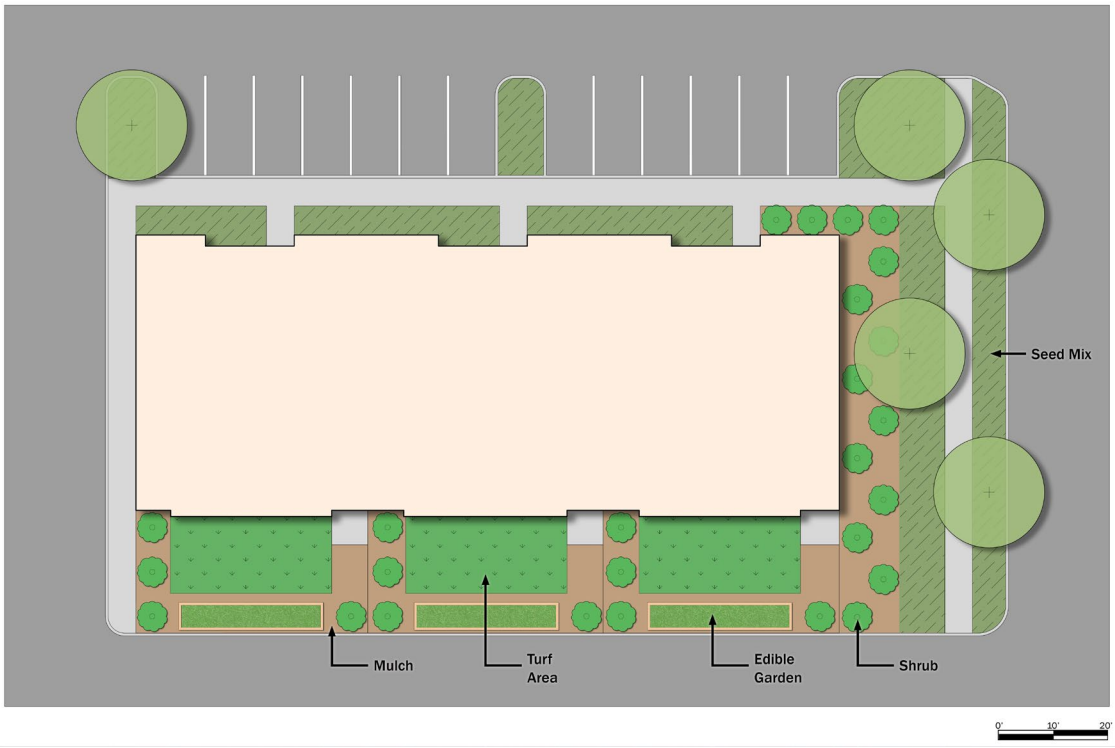

Figure 3: This multi-household residential site plan showcases the 20% maximum allowable turf amount with the 60% coverage requirement satisfied by shrubs (10% coverage) and low water use perennial seed mix (30% coverage).

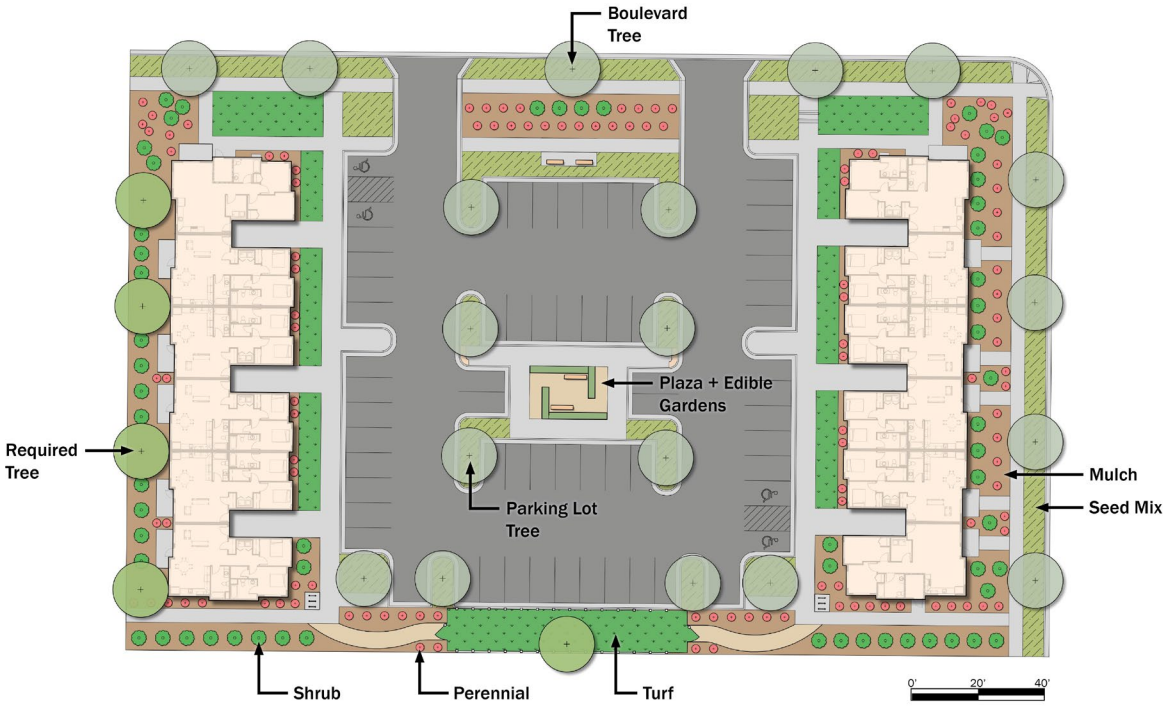

Figure 4: This apartment site plan showcases how these standards apply to a larger site. The design satisfies the 60% coverage requirement with turf (20% coverage), shrubs and perennials (10% coverage), and low water use perennial seed mix (30% coverage).

Parking Lot Requirements

Parking lot landscaping is part of the landscaped area and must meet requirements in this Manual and 38.550.050.B. except for tree requirements as provided below.

Tree Requirements Outside of Parking Lots and Boulevards

1) Tree diversity requirements must be met according to the table below.

Deciduous and Evergreen Tree Plant Diversity Table

Number of Trees	*Maximum % of Single Species*
1-5	Can have 100% of one species
6-10	Maximum 50% of any one species
11-20	Maximum 33% of any one species
21+	Maximum 25% of any one species

2) A minimum of 75 percent of proposed trees must be drought adapted or have a plant factor of 0.3 or less.
3) Rock mulch is discouraged around private trees and prohibited around public, boulevard trees. Public, boulevard trees must have a 3' diameter wood mulch ring 3"-4" in depth.
4) Trees must be planted at a minimum rate of 1 per 1600 square feet of landscaped area.

a) Trees used for residential adjacency requirements outlined in BMC 38.550.050.K may also count towards this requirement.

5) A minimum of fifty percent of trees must be canopy trees. The review authority may adjust this requirement if utility conflicts exist.
6) Transplanted trees exceeding the sizes outlined in BMC 38.550.050.F. may be allowed at the discretion of the review authority.
7) Exemptions:
   a) All areas within 10 feet of the building(s) on site are exempt from the square footage used to calculate the number of required trees.
   b) Landscaped areas under 6 feet wide are exempt from the square footage used to calculate the number of required trees. This does not apply to boulevard tree requirements.
   c) Deciduous and evergreen trees deemed healthy and preserved on site shall apply towards the tree planting requirement at the discretion of the review authority.
   d) Tree requirements for street frontage shall adhere to the requirements listed in BMC 38.550.050.D. These areas are exempt from the square footage used to calculate the number of required trees.

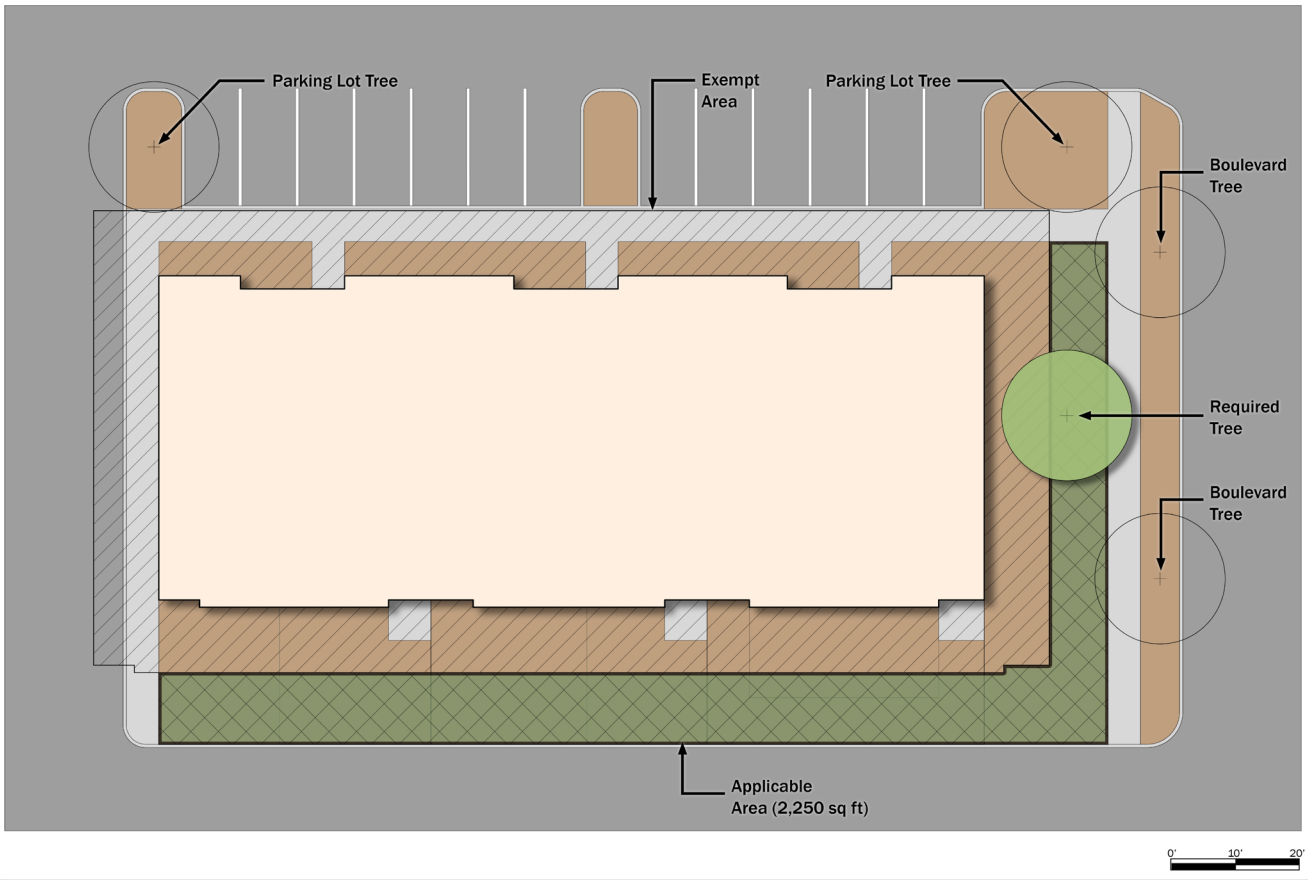

Figure 5: This figure demonstrates how to calculate tree requirements for a site plan. One tree is required for every 1,600 square feet of landscaped area. However, all areas within 10' of the building are exempt from this square footage requirement. As a result, only 2,250 square feet is used to calculate the required number of trees. Only one tree is required for this site plan. Boulevards and parking lots have separate tree requirements and are exempt from this square footage requirement.

Soil Preparation and Amendment Requirements

Plants in healthy soils have an opportunity to develop robust root systems, leading to improved overall health and viability during drought conditions. By amending topsoil, plant die-off can be reduced, especially during the critical plant establishment period.

Soil Quality Requirements

1) Landscaped areas must have a minimum topsoil depth of 6 inches throughout the entire planting area.
2) The topsoil quality requirement may be met by implementing one of the following methods prior to planting:
   a) Amend existing topsoil at a rate of 4 cubic yards of compost/1000 square feet. Compost must meet the State of Montana's compost requirement for soil amendment (Admin. Rule Mont. 17.50.1716). Compost must be spread and mixed evenly into the top 6 inches of topsoil;
   b) Perform a soil test and amend the existing soil as recommended by the soil test; or
   c) Imported topsoil that has been amended pursuant to the recommendations of a soil test.
3) Remove stones that are, at minimum, larger than 2 inches, sticks, roots, construction debris, and other extraneous matter, and legally dispose of them off the property.
4) Compliance with the following practices is required:
   a) Do not apply material or scarify if soil is frozen, muddy, or excessively wet.
   b) Protect areas of in-place soil from additional compaction, disturbance, and contamination during construction.
5) Exemptions:
   a) The building footprint and all areas within 5 feet of the actual building are exempt from the topsoil requirement.
   b) On engineered slopes, only amended planting holes must meet the topsoil requirement.

Soil Testing Requirements

The following requirements apply when performing a soil test:

1) A soil analysis must be conducted by an independent, state-operated, or university-operated soil laboratory with the capability and experience to conduct the required testing.
2) The soil sample(s) must represent a uniform area. Differences in texture (sand, silt, or clay), color, slope, degree of erosion, drainage, past management practices, and types of plant material designed for each area should be considered when collecting the sample. The recommended sampling frequency is no less than one sample per 5,000 square feet of landscaped area.
3) The soil analysis must test the following:
   a) Soil Texture
   b) Percentage of Organic Matter
   c) Soil Reaction (acidity/alkalinity pH value)
   d) Soluble-Salt Content
   e) Nutrients: including nitrogen, phosphorus, potassium, zinc, iron, copper, manganese, and lime.
4) The soil test must be dated no more than 60 days prior to conducting the pre-installation meeting and must be provided to the review authority at the pre-installation meeting.

3.2.2 Landscape Design Plan Requirements

The landscape design plan must meet requirements outlined in BMC 38.220.100.B.

Required Elements of the Landscape Design Plan for Preliminary Plat

The following information must be submitted and approved by the Water Conservation Division at preliminary plat.

The landscape design plan must include property and project information listed in BMC 38.220.100.D.

The landscape plan must match the scale and orientation of the irrigation plan. To satisfy requirements listed in BMC 38.220.040.B., the landscape design must contain a scaled landscape plan detailing the following landscape and plant material information:

1) The landscape design approval pathway selected for compliance (prescriptive vs. performance);
2) The total landscaped area (square feet);
3) The general location of the following vegetation categories, total square footage, and intended plant coverage expressed as a percentage of total landscaped area:
   a) Turf;
   b) Seed mix; and
   c) All other plants except for trees;
4) List the number of required trees, proposed trees, and proposed canopy trees to meet the tree requirements outside of parking lots and boulevards. If existing trees are being preserved, indicate their location and method for protecting existing trees from damage during construction. The location and type of all existing trees over six inches in caliper must be specifically indicated;
5) Type of mulch and application depth;
6) Indication of method used to meet topsoil quality requirements;
7) Areas used solely for water treatment, stormwater retention, or stormwater detention; and
8) Areas that are exempt from this Manual's requirements as provided for in Section 1.3. and 1.4.

Required Elements of the Landscape Design Plan for Final Plat and Site Plan

The following information must be submitted and approved by the Water Conservation Division at final plat or prior to installation, whichever occurs first, or at site plan.

The landscape design plan must include property and project information listed in BMC 38.220.100.D.

The landscape plan must match the scale and orientation of the irrigation plan. To satisfy requirements listed in BMC 38.220.070.A.5. and BMC 38.220.100.A. for final plats and site plans, the landscape design must contain the following landscape and plant material information:

1) The landscape design approval pathway selected for compliance (prescriptive vs. performance);
2) The total landscaped area (square feet):
3) Landscaped areas with specific plant types and their general locations;
4) The square footage and percent coverage based off the total landscaped area of the following vegetation categories:
   a) Turf;
   b) Seed mix; and
   c) All other plants except for trees;
5) A plant schedule including the following plant items shown per page and an overall plant schedule that includes totals of the following: typical symbols, plant names (common and botanical name), quantities, container or caliper sizes at installation, height and width at maturity, and spacing for groundcovers as applicable. When using seed mixes or plant mixes, include species composition as a percentage and total square feet;
6) The number of required trees, proposed trees, and proposed canopy trees to meet the tree requirements outside of parking lots and boulevards. If existing trees are being preserved, indicate their location and method for protecting existing trees from damage during construction. The location and type of all existing trees over six inches in caliper must be specifically indicated;
7) Type of mulch and application depth;
8) Indication of method used to meet topsoil quality requirements;

9) Areas used solely for water treatment, stormwater retention, or stormwater detention; and
10) Areas that are exempt from this Manual's requirements as provided for in Section 1.3. and 1.4.

3.2.3 Landscape Requirements for Boulevards and Street Medians

This Section describes minimum landscape requirements for rights-of-way and street medians. Unless specifically called out in this Section, requirements outlined in Section 3.2.1 and 3.2.2 of this Manual apply.

Collector, Arterial, and Local Street Boulevards

1) Artificial plant materials are prohibited.
2) The final grade of landscape design elements such as rock and wood mulch must be below the top of the curb to prevent mulch from migrating into the curb line and sidewalk. The curb reveal must not pose a trip hazard. Mulch maintenance and replenishment is the responsibility of the adjacent property owner.
3) Only landscape design elements that will not become damaged from plowing or pose an obstruction to plowing are permitted in rights-of-way boulevard strips.
4) Plant material must comply with street vision triangle requirements outlined in BMC 38.400.100.
5) Maintenance responsibility for landscaping in city rights-of-way is required per BMC 38.550.070.B. Adjacent property owners are responsible for weed mitigation and the replenishment of landscape design elements such as rock and wood mulch.
6) Plant materials that cannot withstand impacts from snow storage and plowing, including being buried under snow throughout the winter months, are prohibited in City rights-of-way boulevard strips. The City is not responsible for damage to plant material and landscape design elements in boulevard strips due to plowing.

Street Medians

1) The installation of turfgrass in City right-of-way street medians is prohibited.
2) Artificial plant materials are prohibited.
3) The final grade of landscape design elements such as rock and wood mulch must be below the top of the curb to prevent mulch from migrating into the street.
4) Landscape design elements that pose an obstruction to snow plowing and snow storage, including but not limited to large rocks and boulders, that are not below the top of the curb line are prohibited.
5) Plant material must comply with street vision triangle requirements outlined in BMC 38.400.100.
6) Plant materials that cannot withstand impacts from snow storage and plowing, including being buried under snow throughout the winter months, are prohibited in City rights-of-way street medians.

3.3 Irrigation Design Requirements

This Section applies to landscaped areas requiring permanent irrigation pursuant to BMC 38.550.050.H.

For the efficient use of water, an irrigation system must be carefully designed and planned for the intended function of the project. The following criteria must be complied with as part of the irrigation system design. Irrigation systems must be designed and installed in a manner that supports the conservation of water.

3.3.1 Irrigation Design Standards

Irrigation systems must be designed pursuant to the standards of this Section.

Backflow Device and Controller

1) A backflow device compliant with the City's currently adopted plumbing code for use in an irrigation system is required;
2) Irrigation controllers labeled by U.S. Environmental Protection Agency's WaterSense® Program are required. Except for parks and irrigation systems where the water supply is fully independent of City ownership or maintenance, the controller must be programmed to accommodate any water windows or restrictions for operation such as the day of the week and hours of the day pursuant to BMC 40.02.1290.; and
3) Sensors (rain, freeze, wind, ET, soil moisture, etc.), either integral or auxiliary, that suspend or alter irrigation operation during unfavorable weather conditions or when sufficient soil moisture is present are required.

Sprinklers/Overhead Irrigation

1) All overhead irrigation must consist of multi-stream, multi-trajectory (MSMT) nozzles, or an approved equal, and/or rotors;
2) Head(s) subject to low head drainage must be equipped with integrated check valves to avoid draining when the system completes its cycle;
3) Sprinkler heads must be spaced 2 inches minimum from hardscape edges and installed flush with finished grade;
4) Overhead irrigation must use a 6 inch minimum riser;
5) Overhead irrigation spacing must be designed to achieve head-to-head coverage or per manufacturer specifications;
6) Areas less than 8 feet in width in any direction must be irrigated with drip irrigation, either subsurface or above ground. Overhead spray irrigation is prohibited in areas less than 8 feet wide unless being used for temporary establishment purposes only; and
7) It is encouraged to connect all sprinkler bodies to the lateral line with flexible swing joints or swing pipe.

Drip Irrigation

1) Drip irrigation must be used for all landscaped areas other than turfgrass, creeping or rooting groundcovers, and seeded areas;
2) Drip irrigation must include a pressure regulator and filter;
3) Inline drip irrigation installed on a slope must lay parallel to the elevation contours;
4) Drip irrigation must be installed with the ability to easily flush the line; and
5) All subsurface drip must be installed with air/vacuum relief valves per manufacturer recommendations.

Irrigation Stations/Zones

1) Each zone must be designed to achieve matched precipitation rates;
2) Irrigation zones must be separated based on hydrozone, which considers irrigation type (e.g. overhead or drip) and plant water use (e.g. low, medium, or high);

3) Stations that irrigate trees cannot irrigate other plant types. An individual irrigation station may irrigate more than one tree. The established size and extent of the root zone must be considered when designing irrigation for trees. Drip irrigation, such as emitters, root watering systems, or bubblers, must be used to irrigate trees.
4) Each irrigation zone must be designed to prevent runoff, overspray, or other similar conditions; and
5) Stations must be designed to achieve the highest possible distribution uniformity using the manufacturer's recommendations.

System

1) Valve boxes must be installed in a manner that prevent breaks and must easily be accessible for repairs;
2) Irrigation pipe installed under hardscape surfaces must be sleeved with a rigid pipe 1 inch larger than the pipe within it, at a minimum;
3) Operating pressure of the irrigation system must meet manufacturer's recommended operating pressure.
   a) Pressure-regulating devices must be installed to ensure proper operation. This may be accomplished by using pressure regulators at the zone valve or integrated into the sprinkler body. Sprinkler bodies with integrated pressure regulators are encouraged. If using sprinkler bodies with integrated pressure regulators, the bottom inlet must be used; and
   b) A booster pump is required If water pressure is below the required operating pressure.
4) A flow sensor and master valve are required for systems with mainlines greater than or equal to (≥) 2 inches that are connected to City municipal water. Flow sensors must be installed according to manufacturer's specifications and tested for functionality.
   a) A flow sensor serves two primary functions: 1) to detect breaks so the controller can suspend watering and notify the irrigation manager, and 2) to assist in efficient system operation by reducing the watering window the system requires to complete its watering cycle. It may also be used to track the irrigation system's water consumption.

3.3.2 Irrigation Building Additions and Remodel Improvements

For building additions and remodels falling under Level II Improvements as defined in BMC 38.500.020.B.2., the following irrigation components must be installed:

1) Irrigation controllers labeled by U.S. Environmental Protection Agency's WaterSense® Program are required. Except for parks and irrigation systems where the water supply is fully independent of City ownership or maintenance, the controller must be programmed to accommodate any water windows or restrictions for operation such as the day of the week and hours of the day pursuant to BMC 40.02.1290.;
2) Sensors (rain, freeze, wind, ET, soil moisture, etc.), either integral or auxiliary, that suspend or alter irrigation operation during unfavorable weather conditions or when sufficient soil moisture is present are required; and
3) All overhead irrigation must consist of multi-stream, multi-trajectory (MSMT) nozzles, or an approved equal, and/or rotors.

3.3.3 Irrigation Design Plan Requirements

The irrigation designer must meet requirements outlined in BMC 38.220.100.C. Both prescriptive and performance landscape design pathways must follow the irrigation requirements of this Section unless otherwise noted.

Required Elements of the Irrigation System Design Plan for Preliminary Plat

The following information must be submitted and approved by the Water Conservation Division at preliminary plat.

An irrigation design plan must be provided with the submission of a preliminary plat. To satisfy requirements listed in BMC 38.220.040.B.6., the irrigation design, at a minimum, must contain the following information:

1) An irrigation water requirement (IWR) in units of gallons per year. For applications seeking plan approval via the performance landscape design pathway, the required water budget calculation serves as the project IWR. For those seeking plan approval via the prescriptive landscape design pathway, the following must be used in the IWR calculation, as applicable:

Cool season turfgrass	18.4 gallons/ft^2/year
Drought-adapted woody plants and herbaceous perennials	5.4 gallons/ft^2/year
Drought tolerant	1.8 gallons/ft^2/year

2) Water supply source location, ownership (e.g. private or public), and type(s) (e.g. municipal, existing surface water, groundwater well). Identify areas irrigated with non-municipal water, including total square footage. Include all supporting documentation of compliance with all State, County, and City regulations as applicable. If using a well for irrigation, provide pre-determination/approval by DNRC for the well;
3) Assumed static water pressure at the point of connection to the water supply;
4) The general location of areas irrigated by the following methods:
   a) Overhead irrigation (e.g. rotors/rotary nozzles);
   b) Drip irrigation;
   c) Temporary irrigation, if applicable, including indication of whether overhead or drip irrigation will be used.
5) Areas that are exempt from this Manual's requirements as outlined in Section 1.3. and 1.4.; and
6) A scaled plan that matches the scale and orientation of the landscape plan representing the irrigation components listed below with unique symbols and general locations, an irrigation schedule, and the following required information:
   a) Property line;
   b) Easements;
   c) Existing or proposed structures;
   d) Impervious surfaces;
   e) Existing features consistent with the landscape design plan;
   f) Point of connection;
   g) Backflow prevention device;
   h) Irrigation controller labeled by U.S. Environmental Protection Agency's WaterSense® Program;
   i) Rain, freeze, wind, evapotranspiration (ET), or soil moisture sensor(s); and
   j) Irrigation sleeves.

Required Elements of the Irrigation System Design Plan for Final Plat or Site Plan

The following information must be submitted and approved by the Water Conservation Division at final plat or prior to installation, whichever occurs first, or at site plan.

The irrigation plan must match the scale and orientation of the landscape plan. To satisfy requirements listed in in BMC 38.220.070.A.5. and BMC 38.220.100.A. for final plats and site plans respectively, the irrigation design, at a minimum, must contain the following information:

1) An irrigation water requirement (IWR) in units of gallons per year. For applications seeking plan approval via the performance landscape design pathway, the required water budget calculation serves as the project IWR. For those seeking plan approval via the prescriptive landscape design pathway, the following must be used in the IWR calculation, as applicable:

Cool season turfgrass	18.4 gallons/ft^2/year
Drought-adapted woody plants and herbaceous perennials	5.4 gallons/ft^2/year
Drought tolerant	1.8 gallons/ft^2/year

2) An irrigation schedule that shows the total number of each component included in the irrigation design plan including make, model, size, and quantity of the following irrigation components per page and an overall irrigation schedule showing total quantities of the following components (as applicable). Quantities do not need to be provided for lateral lines, mainlines, sleeves, drip irrigation, rotors, and sprinklers.
   a) Point of connection;
   b) Backflow prevention device;
   c) Irrigation controller labeled by U.S. Environmental Protection Agency's WaterSense® Program;
   d) Rain, freeze, wind, evapotranspiration (ET), or soil moisture sensor(s);
   e) Flow sensor, if applicable;
   f) Isolation valve(s);
   g) Remote control valve(s);
   h) Pressure regulator(s);
   i) Pressure regulator and filter for drip irrigation;
   j) Drip irrigation;
   k) Sprinklers and Rotors:
      i) Pop-up heights;
      ii) Radius and arc;
   l) Pipe type and size including lateral lines, mainlines, and sleeves;
   m) Quick coupler(s);
   n) Temporary irrigation, if applicable, including indication of whether overhead or drip irrigation will be used; and
   o) If applicable, the location and set pressure of the booster pump;
3) A scaled plan that matches the scale and orientation of the landscape plan representing the irrigation components listed above with unique symbols and general locations, along with the following required information:
   a) Property line;
   b) Easements;
   c) Existing or proposed structures;
   d) Impervious surfaces;
   e) Existing features consistent with the landscape design plan;
   f) Water supply source location and type(s) (e.g. municipal, existing surface water, groundwater well). Identify areas irrigated with non-municipal water, including total square footage. Include all supporting documentation of compliance with all State, County, and City regulations as applicable;
   g) Assumed static water pressure at the point of connection (POC) to the water supply;
   h) Connection point for winterization;
   i) Irrigation valves labeled to indicate flow rate (gallons per minute), station number, temporary irrigation (if applicable), and valve size; and
   j) Identification of the worst case station, or critical station, that faces the most pressure loss. Provide the pressure required for this station's proper operation and the pressure delivered after accounting for pressure loss. Provide information showing pressure loss from the mainline, pressure loss from any elevation change to the POC, pressure loss from the backflow, and from any other applicable system components.

4) Except for parks and irrigation systems where the water supply is fully independent of City ownership or maintenance, a watering schedule demonstrating the system can meet the landscape's peak demand, or water need during the hottest month, while remaining within the City's watering window as outlined in BMC 40.02.1290. Appendix D contains evapotranspiration rate information to help determine water need.
    a) If the watering window cannot be met after the first 45 days of plant establishment, an exemption request form must be submitted to the Water Conservation Division for approval per Administrative Order 2023-02 upon submission of the Landscape Installation Certificate of Completion.
    b) The watering schedule must consider the following information and parameters for each zone/station:
        i) Plant material,
        ii) Watering days;
        iii) Irrigation run times (hours or minutes per irrigation event to avoid runoff);
        iv) Number of cycle start times required for each irrigation event to avoid runoff;
        v) Application rate;
        vi) Root depth;
        vii) Plant type;
        viii) Soil type;
        ix) Slope;
        x) Sun or shade exposure;
        xi) Distribution uniformity or efficiency factor; and
        xii) Whether the station/zone is temporary or permanent.
5) Areas that are exempt from this Manual's requirements as outlined in Section 1.3. and 1.4.

3.3.4 Irrigation Operation and Maintenance

Irrigation management includes the planning of water use, monitoring of water use, and verifying that equipment is maintained and properly adjusted for optimal performance. As the landscape matures, adjustments to the system must be in harmony with the original intent of the irrigation design. As such, the following operation and maintenance requirements are ongoing obligations of any development subject to this Manual:

1) Watering schedule must be regulated by an irrigation controller labeled by U.S. Environmental Protection Agency's WaterSense® Program. Except for parks and irrigation systems where the water supply is fully independent of City ownership or maintenance, all irrigation scheduling must be programmed to operate within the City's watering window outlined in BMC 40.02.1290;
2) Scheduling of irrigation events must match the needs of the plants to maintain health and meet the function of the landscape. This includes regular adjustments for plant establishment, plant maturity, and seasonal variations in weather;
3) Irrigation frequency and duration must account for soil texture and slope to prevent runoff;
4) Irrigation systems must be maintained to ensure proper operation for water use efficiency;
5) Regular operation and maintenance includes, but is not limited to, routine inspection, adjustment, and repair of the irrigation system;
6) Repair of all irrigation equipment must be done with components of equal or greater efficiency and quality;
7) When winterizing systems with flow sensors, manufacturer recommendations must be followed to prevent damaging the flow sensor assembly; and
8) All areas irrigated with temporary irrigation by means of connection to the irrigation controller must have run times reduced to zero minutes, wires disconnected, or components physically removed after the plant establishment period.

3.3.5 Irrigation Requirements for Boulevards and Street Medians

This Section describes minimum irrigation requirements for rights-of-way and street medians. Unless specifically called out in this Section, requirements outlined in Section 3.3.1 and 3.3.2 of this Manual apply.

Collector, Arterial, and Local Street Boulevards

1) The installation of overhead spray irrigation in City rights-of-way boulevard strips along all collector, arterial and local streets is prohibited in areas less than eight feet wide unless the overhead spray irrigation is used for temporary plant establishment purposes only.
2) Whenever a subsurface drip system is installed in these areas, it must also be equipped with a system pop-up indicator to help identify leaks.

Street Medians

1) The installation of overhead spray irrigation in City rights-of-way street medians is prohibited in areas less than eight feet wide unless the overhead spray irrigation is used for temporary plant establishment purposes only.
2) Whenever a subsurface drip system is installed in these areas, it must also be equipped with a system pop-up indicator to help identify leaks. In these areas, the irrigation mainline, lateral lines, and wiring must be in individual sleeves.

3.3.6 Irrigation Requirements for Public Parks

1) Public parks must follow the Manual requirements listed in Section 3.3 and include the relevant information in applicable plans as required in BMC 38.220.060.A.14. except for the following:
   a) Ensuring that the system can meet the landscape's peak water demand while fitting within the watering window (Sec 3.3.2). Due to the size of some parks, it may not be possible to irrigate the entire landscape within the defined watering window; and
   b) Flow sensor requirements unless otherwise prescribed by the Parks Department.
2) In addition, irrigation system components, such as a controller, rotor, or tree bubbler, must have their make and model approved by the Parks Department.

APPENDIX A: DEFINITIONS

Unless otherwise specifically stated, the terms used in this Manual have the meaning set forth below:

"Application rate" means the depth of water that the irrigation system applies over a period of time. Usually expressed in units of depth per time (e.g. inches of water/hour).

"*Backflow" or "Backflow prevention device*" means a device used to prevent pollution or contamination of the water supply due to the reverse flow of water from the irrigation system.

"Boulevard" or "Boulevard strip" means the area between the street and sidewalk.

"Canopy tree" means a species of tree which normally bears crown foliage no lower than six feet above ground level upon maturity.

"*Check valve*" means a *valve* located under a *sprinkler body*, or other location in the irrigation system, to hold water in the system to prevent drainage from *sprinkler bodies* when the irrigation system is not operating.

"*City*" means the City of Bozeman or its authorized designee.

"Controller" see *irrigation controller*.

"*Distribution uniformity*" means the measure of the evenness of irrigation water applied to a defined *landscaped area* expressed as a decimal.

"Drip irrigation" means a non-spray, low volume irrigation system using *emitters*.

"Edible garden" means an area within the landscape that is dedicated to the production of food.

"*Emitter*" means a *drip irrigation* emission device that delivers water from the drip system to the soil. Emitter flow rates are measured in gallons per hour (GPH).

"Establishment period" means the time period when landscape water demands may be adjusted to establish new plantings.

"ET sensor" means a *sensor* that uses evapotranspiration (ET) data to adjust the watering cycle.

"*ETo*" or *"ET"* means the amount of water lost annually from plants and soil, depending on sun, wind, humidity and temperature. *ETo* is expressed in inches per day, month, or year as represented in Appendix D and is an estimate of the evapotranspiration of a large field of 4"-7" tall, cool-season grass that is well watered. Local values are sourced from U.S. Bureau of Reclamation AgriMet data.

"Evapotranspiration rate" see *ETo*.

"*Flow rate*" means the rate of water or volume per unit period of time.

"Flow sensor" means a *sensor* that detects the flow of water through an irrigation system.

"Freeze sensor" means a *sensor* that can detect the temperature.

"Groundcover" means low growing, perennial species that create a mat of continuous cover over the ground, which makes it difficult for weeds to establish in the *landscape*.

"*Hardscapes*" or "*hardscape surface*" means any hard material or feature including pervious and non-pervious materials installed in or around a *landscaped area*, such as pavements, pavers, concrete, or walls.

"*Hydrozone*" means a portion of the *landscaped area* which has plants with similar water needs grouped together that are typically irrigated by one *valve* or *station* with the same irrigation type. A *hydrozone* may be irrigated or non-irrigated.

"*Infiltration rate*" means the rate of water entry into the soil expressed as a depth of water per unit of time (e.g., inches per hour).

"Inline drip irrigation" means a style of *drip irrigation* that uses drip pipe with integrated *emitters* creating an even distribution across the *landscaped area*.

"Irrigation" means supplemental water that is artificially applied to an area for the purpose of fostering plant growth and health.

"Irrigation controller" means the device that starts and stops the irrigation watering based on a watering *schedule.*

"Irrigation design plan" means a scaled drawing of an irrigation system which lists irrigation information required by this Manual.

"*Irrigation efficiency*" or "*IE*" means the measurement of the amount of water used by plants divided by the amount of water applied to a *landscaped area*.

"*Isolation valve*" means a *valve* installed downstream of the point of connection of the irrigation water supply to shutdown water flowing through the *mainline*.

"Landscaped area" means the area of a lot where landscaping has been or is proposed to be installed. It also includes landscape design elements such as rock mulch and wood mulch. It does not include footprints of buildings or structures, sidewalks, driveways, walkways, or other hardscaped areas, such as decks or pervious pavers.

"Landscaping" means an area with vegetative plantings, such as shrubs, perennials, and *turfgrass*, creeping or rooting *groundcovers*, seed mixes, or other living plants.

"*Landscape design plan*" means a scaled drawing of a landscape which lists landscape information required by this Manual.

"Landscape installation certificate of completion" means the certificate included in Appendix F in this Manual that must be submitted to the *City*.

"*Lateral line*" means the water delivery pipeline that supplies *irrigation* water to the *emitters* or *sprinkler bodies* from the irrigation *zone valve*.

"*Mainline*" means the pipeline that delivers *irrigation* water from the water source to the irrigation *zone valve(s)* or outlet(s).

"Matched precipitation" means an individual irrigation *zone* in which all *sprinklers* have similar *precipitation rates*.

"MSMT nozzle" or *"Multi-Stream, Multi-Trajectory nozzle"* means *nozzles* designed to distribute water in individual streams, of varying trajectories, which rotate across the distribution area.

"Nozzle" means the opening of a *sprinkler body* used to control the volume of discharge, distribution pattern, and droplet size.

"*Operating pressure*" means a measurement of water pressure with the water in motion.

"Organic mulch" means ground covering material consisting of organic matter such as wood chips, compost, straw, or leaves.

"Overhead spray irrigation" means the *sprinkler* or spray *nozzle* components of an irrigation system; or the act of applying water to a landscape by *sprinklers* or spray *nozzles* that deliver water to the landscape through the air.

"*Overspray*" means the *irrigation* water which is delivered beyond the target *landscaped area*.

"Plant factor" means a factor that, when multiplied by *ETo*, estimates the amount of water needed by plants. The *plant factor* for very low water use plants is 0.1; low water use plants is 0.3; medium water use plants is 0.5-0.6; and high water use plants is 0.8.

"Precipitation rate" see a*pplication rate*.

"Rain sensor" means a *sensor* that detects the amount of rainfall received.

"Raised bed" means raised above the surface of the ground; usually framed by some barrier such as wood or stones.

"Recommended operating pressure" means the pressure at which the parts of an irrigation system are designed to operate at by the manufacturer.

"Riser" means the component of a *sprinkler body* that extends vertically to elevate the *nozzle* so it can achieve proper coverage.

"Rock mulch" means ground covering material consisting of inorganic matter: rocks, gravel, decomposed granite, etc.

"Rotor sprinkler body" or *"rotor"* means a *sprinkler body* that distributes water to the *landscaped area* by use of a single rotating stream.

"*Runoff*" means water that is not absorbed by the soil or *landscape* to which it is applied and flows from the *landscaped area* to waste.

"Sensor" means a component of an irrigation system that has the ability to alter or suspend watering cycles based on locally collected data.

"Soil moisture sensor" means a *sensor* that detects the soil moisture level in the *landscaped area*.

"Spray irrigation" see *overhead spray irrigation*.

"Sprinkler body" means the exterior case or shell of a *sprinkler* incorporating a means of connection to the piping system designed to convey water to a *nozzle* or opening.

"*Sprinkler*" means an emission device consisting of a *sprinkler body* with one or more openings to convert irrigation water to high velocity discharge through the air.

"*Static water pressure*" means the pipeline or water supply pressure when water is not flowing.

"*Station*" means an area served by one *valve* or by a set of *valves* that operates simultaneously.

"*Swing joint/pipe*" means an irrigation component that provides a leak-free connection between the emission device and *lateral line* to allow movement in any direction.

"*Temporary irrigation*" means a temporary watering system designed to transport and distribute water to plants for a limited period, primarily used during the *establishment period*, after which time the irrigation is terminated or abandoned.

"*Turfgrass*" or *"turf"* means a relatively high water use *groundcover* surface of grass and the surface layer of earth held together by its roots, including but not limited to cool season lawn grasses. For the purposes of this Manual, turfgrass has a *plant factor* of 0.8 or above.

"Urban farming" see *edible garden.*

"*Valve*" means a device used to control the flow of water in an irrigation system.

"Watering schedule" means collectively the *zone* or *station* run times (duration), *zone* or *station* watering days (frequency), and the time that the *irrigation* will begin running on the selected days (start times).

"*Watering window*" *or "water window"* means the period, timeframe, or continuous hours of the day(s) in which outdoor watering is permitted.

"Wind sensor" means a *sensor* that detects the wind speed.

"Zone" means the section of an irrigation system served by a single *valve*. Zones are comprised of similar irrigation types and plant material types with similar water requirements.

"Zone valve" means an electronically controlled automatic *valve* that operates a group of *sprinkler bodies* or a specific area of *drip irrigation* in the *landscaped area*.

APPENDIX B: WATER BUDGET CALCULATOR (PERFORMANCE PATHWAY ONLY)

The Water Budget Calculator is a spreadsheet tool created for consistent calculation of supplemental irrigation water demands for various plant types installed in the landscape and serves as a tool to ensure landscapes are compliant with this Manual. A completed Water Budget Calculator is required for all performance-based landscape design plans. To complete the Water Budget Calculator, project applicants will need to enter inputs such as irrigation type and total square feet for each hydrozone type. The calculator will auto-calculate the supplemental irrigation water use of each plant type category, the total area, and the average gallons of supplemental irrigation per square foot of landscape. Additional details on the elements and calculations in the Calculator can be found in Appendix D.

The Water Budget Calculator file can be downloaded at www.bozeman.net or by contacting the City's Water Conservation Division. The City may update factors and calculation methods utilized within the Calculator. Such updates may occur at the discretion of the City.

Section 3 Water Budget Calculator for developments subject to BMC 38.550.040 (e.g. plats, site plans, planned development zones). Water budget not to exceed 8 gal/square foot.

Water Budget Area (sq. ft.) 10,000

Hydrozone Water Use Category	Plant Factor (PF)	Net ETo	Irrigation Type	Irrigation Efficiency	Irrigation gallons per sq. ft.	Sq. Ft.	Water Use (gal)	Percent of Total Water Budget Area	Percent of Total Irrigation Demand
High	0.8	26	Overhead	0.7	18.4	2,000	36,846	20%	47%
Medium	0.6	26	Drip	0.9	10.7	-	-	0%	0%
Medium	0.6	26	Overhead	0.7	13.8	-	-	0%	0%
Low	0.3	26	Drip	0.9	5.4	7,000	37,613	70%	48%
Very Low	0.1	26	Drip	0.9	1.8	1,000	1,791	10%	2%
N/A	0.1	26	N/A	0.7	2.3	-	-	0%	0%
					Total Area	10,000			

Tree Water Calculator

Tree Water Use Category	Plant Factor (PF)	Net ETo	Irrigation Efficiency	Irrigation gallons per sq. ft.	Number of Trees	Sq. Ft.	Water Use (gal)	Percent of Total Water Budget Area	Percent of Total Irrigation Demand
High	0.8	26	0.9	14.3	-	-	-	0%	0%
Medium	0.6	26	0.9	10.7	1	28	301	0%	0%
Low	0.3	26	0.9	5.4	12	336	1,805	3%	2%
Very Low	0.1	26	0.9	1.8	-	-	-	0%	0%
						TOTAL WATER USE	78,357		
						GAL/SF (AVG)	7.8		
						Not to exceed 8 GAL/SF.			

APPENDIX C: PLANT LIST

This list is intended to serve as a supplemental resource to aid in creating compliant landscape designs. The plant list also contains plant factors, which will help to determine a plant's hydrozone water use category. Plants not included can still be used by matching their water use to the appropriate hydrozone water use category and plant factor.

The plant list can be found on the City's website at www.bozeman.net or at the City's Water Conservation Division office.

APPENDIX D: WATER BUDGET CALCULATOR INFORMATION

CALCULATOR INFORMATION & EQUATIONS

The water budget calculation is based on peer-reviewed studies, other cities' water budget calculation methodologies, and the Simplified Landscape Irrigation Demand Estimation (SLIDE) methodology. SLIDE serves as the basis for the ANSI/ASABE S623 Standard, *Determining Landscape Plant Water Demands* and is the most widely applicable and accepted industry standard for determining urban landscape plant water demands. This calculator only applies to performance based landscape and irrigation submittals.

WATER BUDGET AREA CALCULATOR INFORMATION

The Water Budget Area Calculator is used to determine the area input for the Water Budget Calculator. This calculator takes the Total Lot Area subtracted by the Building Footprint, Hardscape (e.g. sidewalk, pavers, or driveway), Exemptions, and areas with Artificial Plant Materials to determine the Water Budget Area (sq. ft.).

Constant Categories (no input required)

This category does not require any user input.

1) Category
    a) These site elements determine the water budget area to be used in the calculator.

Input Categories

Values are added by the user based on the site dimensions.

1) Area (sq. ft.)
    a) This is each category's area within the site (total lot area, building footprint, hardscape, walkways, exemptions, and artificial plant materials).

Output Categories

1) Water Budget Area (sq. ft.)
    a) This is the Total Lot Area category subtracted by the Building Footprint, Hardscape (e.g. sidewalk, pavers, or driveway), Walkways, Exemptions, and Artificial Plant Materials categories.

WATER BUDGET CALCULATOR INFORMATION

One of two Water Budget Calculators will be used depending on the development type. The Section 2 Water Budget Calculator is used for all developments falling under Section 2 of this Manual, while the Section 3 Water Budget Calculator is used for all developments falling under Section 3 of this Manual. Both calculators share the same categories, inputs, and outputs but have a different allowable water budget (gallons of supplemental irrigation required per square foot of water budget area).

When using seed mix or plant mix, the plant with the highest plant factor is used to determine that mix's Hydrozone Water Use Category.

Constant Categories (no input required)

These categories do not require any user input. The water budget calculation considers the following in determining the total water demand of the landscape:

1) Hydrozone Water Use Category

a) The Hydrozone Water Use Category is based on the SLIDE methodology and has been refined for the City's climate. The intent of these broad categories is to group plantings of similar water use and provide a reasonable Plant Factor to be used in the water budget calculation for each hydrozone area.
b) Appendix C includes the City of Bozeman Plant List with plant factors and serves as a supplemental resource to aid in creating compliant landscape designs.

2) Plant Factor (PF)
   a) Plant Factors are assigned to each plant type category and adjust the net evapotranspiration (ET_o) to better reflect water needs.
   b) For example, cool season turfgrass maintained at a height of typical urban landscapes requires about 80 percent of the Net ET_o to be replenished with supplemental irrigation to maintain plant health. Drought adapted plants typically require about 30 percent of the total Net ET_o to be replenished with supplemental irrigation to maintain plant health. Therefore, the plant factor used for cool season turfgrass is 0.80, and the plant factor used for drought adapted plants is 0.30. Multiplying the total Net ET_o by the applicable plant factor will properly adjust the water demand for each plant type based on the City's climate.

3) Net ET_o
   a) Net evapotranspiration is a combination of water lost through soil evaporation and plant transpiration, minus the effective precipitation amount (25% of total precipitation). The Net ET_o value (expressed in inches) directly correlates to the amount of supplemental water needed to maintain plant health.
   b) Data used to determine seasonal Net ET_o demands were gathered from a local weather station that monitors evapotranspiration (ET_r) values based on a reference crop of alfalfa, which are adjusted for grass to arrive at ET_o. Seasonal ET_o and seasonal rainfall values observed in the City from 2011 to 2021 were averaged to determine the Net ET_o value used in the Water Budget Calculator.

Agrimet Bozeman: Monthly ETo Total (in)

Year	May	June	July	August	September	May-Sept Total
2011	4.11	5.23	7.23	6.26	4.64	27.47
2012	4.40	6.54	7.12	6.50	4.49	29.04
2013	4.36	5.70	7.49	6.46	3.77	27.78
2014	4.73	5.11	7.08	4.96	3.69	25.57
2015	4.18	6.29	6.20	5.80	4.20	26.67
2016	4.54	7.01	7.60	6.80	3.30	29.25
2017	5.04	5.03	8.09	6.56	4.35	29.07
2018	4.51	5.04	6.61	5.30	3.54	25.00
2019	4.45	6.10	7.10	5.57	3.42	26.63
2020	4.81	5.04	6.43	6.01	4.17	26.46
2021	4.35	7.35	8.62	5.61	4.58	30.50
Average:	**4.50**	**5.86**	**7.23**	**5.98**	**4.01**	**27.59**

Agrimet Bozeman: Monthly Precipitation Total (in)

Year	May	June	July	August	September	May-Sept Total
2011	2.83	2.87	0.76	0.90	0.57	7.92
2012	1.77	0.90	0.60	0.21	0.21	3.70
2013	3.07	2.74	0.62	0.40	2.60	9.42
2014	1.85	2.77	0.37	2.72	1.24	8.95
2015	2.86	0.59	1.52	0.75	1.21	6.93
2016	2.50	0.74	1.06	0.83	2.03	7.17
2017	2.53	2.10	0.16	0.47	2.50	7.75
2018	2.38	2.74	0.24	1.10	0.49	6.94
2019	1.82	2.18	2.56	0.77	3.88	11.21
2020	0.99	3.50	0.74	0.58	0.74	6.55
2021	3.29	0.81	0.77	1.83	0.15	6.85
Average:	**2.35**	**1.99**	**0.85**	**0.96**	**1.42**	**7.58**

c) The steps used to arrive at the Net ET_o of 26 inches used in the Water Budget Calculator are included below:
   i) Seasonal average ET_o (2011-2021) from Bozeman Agrimet station: 27.59 inches
   ii) Seasonal average precipitation (2011-2021) from Bozeman Agrimet station: 7.58 inches
   iii) Effective precipitation: 25 percent of total average precipitation (7.58 in. * 0.25) = 1.90 inches
   iv) Net ET_o (Total ET_o - Effective Precipitation): 27.59 in. – 1.90 in. = 25.69 inches
   v) Round 25.69 up to 26 inches

4) Irrigation Gallons per Square Foot
   a) This value is automatically generated based on the water budget variables listed above.
   b) Irrigation gallons per square foot: (PF * Net ET_o * 0.62)*/IE
      i) Where: PF = plant factor, Net ET_o = 26 inches, 0.62 is a conversion factor (inches to gallons per square foot), and IE = irrigation efficiency
5) Water Budget Area (sq. ft.)
   a) This is automatically generated by the Water Budget Area Calculator.

Input Categories

Values are added by the user based off the project's landscape design.

1) Irrigation Type
   a) Irrigation Type is selected using a drop down menu. When drip or overhead irrigation is selected, a value is automatically assigned in the Irrigation Efficiency column. Drip irrigation has a 0.9 irrigation efficiency, while overhead irrigation has a 0.7 irrigation efficiency.
   b) Additional rows can be added as needed to reflect different irrigation types for each hydrozone water use category.
2) Sq. Ft.
   a) This is the square footage of each hydrozone water use category.
   b) The total of all inputs within this category is equal to the Water Budget Area (sq. ft.).

Output Categories

These values are automatically generated based off input values. These output values are used to determine if a site is compliant with the Bozeman Municipal Code.

1) Irrigation Efficiency
    a) Irrigation Efficiency is derived from measurements and estimates of irrigation system characteristics and management practices recognizing that it is not possible for each drop of supplemental irrigation to be beneficially used by the plant(s) it targets.
    b) Factors that could reduce the efficiency of irrigation include wind drift, evaporative loss, application method, runoff, and overspray. For this reason, an irrigation efficiency factor is applied to the water budget calculation to adjust the total amount of water applied to the landscape to more accurately account for real-world losses. Drip irrigation, which applies water directly to plant roots, is more efficient than overhead spray irrigation which can be lost to wind drift, evaporation, and overspray.
2) Water Use (gal)
    a) This value represents each hydrozone category's supplemental water use per season in gallons.
3) Percent of Total Water Budget Area
    a) This value represents plant type area expressed as a percentage of the total Water Budget Area.
4) Percent of Total Irrigation Demand
    a) This value represents each plant type's water requirement as a percentage when compared to the Total Water Use.
5) Total Area
    a) The total of all Sq. Ft. inputs and is equal to the Water Budget Area (sq. ft.).

WATER BUDGET CALCULATOR - TREE WATER CALCULATOR

The tree water calculator is used to calculate tree water use and combines water use with the Water Budget Calculator to determine if a landscape is compliant. This calculator shares some of the same categories, inputs, and outputs as the Water Budget Calculator. Only the differences between the two calculators will be discussed in this section.

Constant Categories (no input required)

1) Tree Water Use Category
    a) The Tree Water Use Category is based on the SLIDE methodology and has been refined for the City's climate. This category provides a reasonable Plant Factor used in the water budget calculation.
    b) Appendix C includes the City of Bozeman Plant List with plant factors and serves as a supplemental resource to aid in creating compliant landscape designs.
2) Irrigation Efficiency
    a) Irrigation Efficiency is derived from measurements and estimates of irrigation system characteristics and management practices recognizing that it is not possible for each drop of supplemental irrigation to be beneficially used by the plant(s) it targets.
    b) Since drip irrigation is required for trees, a 0.9 efficiency factor is used.

Input Categories

Values are added by the user based off the project's landscape design.

1) Number of Trees
    a) This is the total number of trees including boulevard and parking lot trees for each Tree Water Use Category.

Output Categories

1) Sq. Ft.
    a) This is the square footage used to calculate each tree category's water use.
    b) This is automatically calculated based on the number of trees multiplied by 28 square feet, or a 6' circle representing the drip irrigation surrounding a tree.
2) TOTAL WATER USE
    a) This value represents the entire property's supplemental water requirement per season in gallons.
3) GAL/SF (AVG)
    a) This is the average supplemental irrigation required per square foot of Water Budget Area over the entire season in gallons.
    b) The Section 2 Water Budget Calculator is allowed a water budget of 10 gal/square foot.
    c) The Section 3 Water Budget Calculator is allowed a water budget of 8 gal/square foot.

APPENDIX E: BUILDING PERMIT LANDSCAPE & IRRIGATION SELF-CERTIFICATION FORM

Property Owner: _____

Applicant (if different from owner): _____

Property Address: _____

Property Type & Number of Units (e.g. Single Household, 1 Unit): _____

Owner Email: _____ Owner Phone: _____

Applicant Email: _____ Applicant Phone: _____

Building Application Number: _____

A completed form must be submitted with building permit materials for certain development types. For any questions regarding this form and its contents, please contact the City of Bozeman's Water Conservation Division at 406-577-7400 or WaterConservation@Bozeman.net.

Section 1

Is this project part of a site plan, modification, or further development? Yes _____No _____

If yes, enter the site plan, modification, or further development application number below and proceed to Section 3.

Application Number: _____

If no, proceed to Section 2.

Section 2

If this project is not part of a site plan, the following developments must follow the Landscape and Irrigation Design Requirements listed below:

- Single Household or Townhome
- Duplex, Triplex, Fourplex

Landscape and Irrigation Design Requirements:

Select either A) or B):

❑ A) Turfgrass areas may not exceed 35 percent of the total landscaped area or 400 square feet, whichever is more. Remaining landscaped areas must consist solely of low and/or very low water use vegetation (plant factor of 0.3 or less) and landscape design elements such as rock mulch and wood mulch except for raised beds dedicated to edible gardens. Refer to the City of Bozeman plant list for acceptable plant types. It is strongly encouraged to install at least 50% native plants in the overall landscape.

❑ B) In lieu of compliance with the above requirement, for those seeking more landscape design flexibility, a landscape water budget demonstrating that the landscape does not exceed an average annual irrigation demand of 10 gallons per square foot may be provided. Project applicants pursuing the water budget approach must provide a completed Water Budget Calculator as outlined in the City's Landscape and Irrigation Performance and Design Standards Manual with this form.

Additional requirements:

❑ At least 60 percent of the site area not included in footprints of buildings or structures, sidewalks, driveways, walkways, or other hardscaped areas, such as decks or pervious pavers, must be landscaped and maintained

with some combination of vegetative understory plantings, such as shrubs, perennials, turfgrass, creeping or rooting groundcovers, or other living plants (excluding weeds). The installation of at least 50% native plants in the overall landscape is encouraged.

- ❑ Landscaped areas must have at least 6 inches of topsoil depth throughout the entire planted area. The building footprint and all areas within 5 feet of the actual building are exempt from the topsoil requirement. The topsoil requirement may be met by implementing one of the following methods prior to planting:
  - Amend existing topsoil at a rate of 4 cubic yards of compost/1000 square feet;
  - Amend existing topsoil based on the recommendations of a soil test; or
  - Import topsoil to achieve a minimum depth of 6 inches of topsoil.
- ❑ A minimum three-inch layer of mulch must be applied on all exposed soil surfaces of planting areas except for turf areas, creeping or rooting groundcovers, or direct seeding applications where mulch is disadvantageous.
- ❑ Rock mulch is discouraged around private trees and prohibited around public, boulevard trees. Public, boulevard trees must have a 3' diameter wood mulch ring 3"-4" in depth.
- ❑ A minimum of 75 percent of trees shall be drought adapted or have a plant factor of 0.3 or less and must follow the diversity table below:

Deciduous and Evergreen Tree Plant Diversity Table

Number of Trees	*Maximum % of Single Species*
1-5	Can have 100% of one species
6-10	Maximum 50% of any one species
11-20	Maximum 33% of any one species
21+	Maximum 25% of any one species

- ❑ Backflow prevention devices are required (compliance with local plumbing code).
- ❑ Irrigation controllers labeled by U.S. Environmental Protection Agency's WaterSense® Program must be installed.
- ❑ Sensors (rain, freeze, ET, soil moisture, etc.), either integral or auxiliary, that suspend or alter irrigation operation during unfavorable weather conditions or when sufficient soil moisture is present are required.
- ❑ Overhead irrigation must consist of Multi-Stream, Multi-Trajectory (MSMT) nozzles, or an approved equal, and/or rotors.
- ❑ Overhead irrigation must use a 6 inch minimum riser.
- ❑ Sprinkler heads must be spaced 2 inches minimum from hardscape edges.
- ❑ Irrigation systems must be designed to properly address hydrozoning in the landscape.
- ❑ Drip irrigation must be used outside of lawn areas where irrigation is installed.
- ❑ Areas less than 8 feet wide must be irrigated by drip irrigation. Overhead irrigation is prohibited in areas less than 8 feet wide unless only used for temporary establishment.
- ❑ Operating pressure of the irrigation system must meet manufacturer's recommended operating pressure.

- ❑ Trees must be on a separate irrigation valve(s) from other plant types to allow for a unique watering schedule during drought related outdoor watering restrictions. Drip irrigation, such as emitters, root watering systems, or bubblers, must be used to irrigate trees.
- ❑ Irrigation pipe installed under hardscape surfaces must be sleeved in a rigid pipe.
- ❑ Adjacent boulevard(s) must comply with these Landscape and Irrigation Design Requirements and current boulevard tree requirements.

Section 3

By signing this form, the property owner/applicant hereby agrees that the landscape and irrigation will comply with the approved plan or the Landscape and Irrigation Design Requirements. The property owner/applicant understands that this property is subject to random compliance inspections performed by City staff. **Non-compliant properties may be subject to fines or citations according to Chapter 40 in the Bozeman Municipal Code.**

Owner Signature: _____ Date: _____

Applicant Signature: _____ Date: _____

APPENDIX F: LANDSCAPE INSTALLATION CERTIFICATE OF COMPLETION

This form must be submitted prior to receiving final plat for subdivisions or prior to issuance of a certificate of occupancy for site plan applications OR prior to releasing a security as provided by an improvement's agreement. This form does not apply to areas dedicated as parkland.

I hereby certify that:

1) I am a qualified professional per BMC 38.220.100.B. and/or BMC 38.220.100.C. to provide landscape and irrigation design services for:

   Project Applicant Name

   _____

   Project Applicant Telephone

   _____

   Project Applicant Mailing Address

   _____

   The landscape project for the property listed below was installed by me or under my supervision:

   Street Address or Parcel Number(s)

   _____

2) The installation complies with **ONE** of the following:

   a) The required landscape and irrigation system has been installed according to the approved Landscape Documentation Package and complies with the requirements of the approved landscape and irrigation plan, the City of Bozeman Municipal Code, and the City of Bozeman Landscape and Irrigation Design and Performance Standards Manual.

   Yes_____ No _____

   b) The required landscape and irrigation system has been installed in general conformance with the approved Landscape Documentation Package and complies with the requirements of the approved landscape and irrigation plan, the City of Bozeman Municipal Code, and the City of Bozeman Landscape and Irrigation Design and Performance Standards Manual. Deviations from the approved landscape and irrigation system plans still meet the intent of these standards.

   Yes_____ No _____

   (NOTE: If selecting (b), documentation of deviations from the approved landscape and irrigation plans must be provided with this form.)

3) The following are attached hereto:

   a) Documentation verifying the installation of 6" of topsoil through one of the following methods;

      i) Amending existing topsoil at a rate of 4 cubic yards of compost/1,000 square feet,
      ii) Performing a soil test and amending the soil as recommended by the test, or
      iii) Importing topsoil that has been amended pursuant to the recommendations of a soil test.

   b) Temporary irrigation watering schedule, including the plan and date for temporary irrigation to be disabled (if applicable); and

i) The plan for disabling any temporary irrigation must be provided to the entity responsible for irrigation maintenance. Establishment period is a maximum of three growing seasons.

c) Landscape and irrigation record drawings for all City maintained areas. For each area maintained by a unique City division, provide a separate record drawing labeled for that division (e.g. a record drawing for right-of-way area will be labeled for the streets division).

4) For the efficient use of water, all irrigation watering schedules have been developed to use the minimum amount of water required to maintain plant health and function. Watering schedules meet the following:

a) Irrigation scheduling is regulated by a weather or soil moisture sensor connected to an irrigation controller.

Yes_____ No _____

b) Except for parks and irrigation systems where the water supply is fully independent of City ownership or maintenance, all overhead irrigation is scheduled in accordance with BMC 40.02.1290.

Yes _____No _____

(NOTE: If the watering window cannot be met after the first 45 days of plant establishment, an exemption request form must be submitted to the Water Conservation Division for approval per Administrative Order 2023-02.)

5) The irrigation controller(s) contains a document outlining the following:

a) Scheduling parameters used to program the controller; and

b) Peak season watering schedule for the established landscape that specifies each controller station area, run times and frequency, and temporary stations used for plant establishment.

The information I have provided in this Landscape Installation Certificate of Completion is true and correct and is hereby submitted in compliance with the City of Bozeman Landscape and Irrigation Design and Performance Manual and the City of Bozeman Municipal Code.

Print Name	Date
Signature	License Number
Address	
Telephone	E-mail Address

Signature or stamp of the qualified landscape and/or irrigation professional per BMC 38.220.100.B. and BMC 38.220.100.C. (If Appropriate)

Print Name	Date
Signature	License Number
Address	
Telephone	E-mail Address

Signature or stamp of the qualified landscape and/or irrigation professional per BMC 38.220.100.B. and BMC 38.220.100.C. (If Appropriate)